IN THE SPECIFICATION:

Referring to the published specification (US 2004/0144547), please replace paragraphs [0009], [0010], [0048], [0059], and [0063] with the following amended paragraphs:

[0009] Whether the threaded pipe members are of the API type or are premium grade connections, methods are ~~needs~~ needed to ensure a good connection. One method involves the connection of two co-operating threaded pipe sections, rotating the pipe sections relative to one another by means of a power tong, measuring the torque applied to rotate one section relative to the other and the number of rotations or turns which one section makes relative to the other. Signals indicative of the torque and turns are fed to a controller which ascertains whether the measured torque and turns fall within a predetermined range of torque and turns which are known to produce a good connection. Upon reaching a torque-turn value within a prescribed minimum and maximum (referred to as a dump value), the torque applied by the power tong is terminated. An output signal, e.g. an audible signal, is then operated to indicate whether the connection is a good or a bad connection.

[0010] As indicated above, a leakproof metal-to-metal seal is to be achieved, and in order for the seal to be effective, the amount of torque applied to effect the shoulder condition and the metal-to-metal seal is critical. In the case of premium grade connections, the manufacturers of the premium grade tubing publish torque values required for correct makeup utilizing a particular tubing. Such published values may be based on minimum, optimum and maximum torque values, ~~an optimum and maximum torque values,~~ or an optimum torque value only. Current practice is to makeup the connection to within a predetermined torque range while plotting the applied torque vs. rotation or time, and then make a visual inspection and determination of the quality of the makeup. However, in addition to being highly subjective, such an approach fails to take into consideration other factors which can result in final torque values indicating a good final make-up condition when, in fact, a leakproof seal may not necessarily have

been achieved. Such other factors include, for example, the coefficient of friction of the lubricant, cleanliness of the connection surfaces, surface finish of the connection parts, manufacturing tolerances, etc. In general, the most significant factor is the coefficient of friction of the lubricant which will vary with ambient temperature and change during connection make-up as the various components of the lubricant break down under increasing bearing pressure. Eventually, the coefficient of friction tends to that of steel, whereupon the connection will be damaged with continued rotation.

[0048] The above-described torque-turns behavior can be generated using various measuring equipment in combination with a power drive unit used to couple tubing lengths. Examples of a power drive unit include a power tongs unit, typically hydraulically powered, and a top drive unit. According to aspects of the present invention, a power drive unit is operated in response to one or more parameters measured/detected during make-up of a pipe connection. FIGS. 6 and 6A are block diagrams of tubular make-up systems 600 and 600a according to embodiments of the invention. Generally, the tubular make-up systems 600 and 600a comprise power drive units 602 and 602a, power drive control systems 604 and 604a, and a computer system 606. In FIG. 6, the power drive unit is a power tongs unit 602. In FIG. 6A, the power drive unit is a top drive unit 602a. The physical locations of the tie-ins between the top drive control system 604a and the top drive 602a are representative only and may be varied based on specific top drive configurations. The power drive unit may be any variety of apparatus capable of gripping and rotating a tubing length 102, the lower end of which is threaded into a box 106 which, in turn, is threaded into the upper end of a tubing length 104. The tubing length 104 represents the upper end of a pipe string extending into the bore hole of a well (not shown). Since the power tongs unit 602 may be an apparatus well-known in the industry, it is not shown in detail. The tubing lengths 102 and 104 and box 106 are not shown in FIG. 6A but are shown in the figures illustrating more detail of the top drive 602a, discussed below.

[0059] Upon continuing rotation, the target detector 654 monitors for the calculated target value(s) (step 732). Once the target value is reached, rotation is

terminated (step 734). In the event both a target torque value and a target turns value are used for a given makeup, rotation may continue upon reaching the first target or until reaching the second target, so long as both values (torque and turns) stay within an acceptable range.

[0063] However, in one aspect, basing the target value on a delta turns value provides advantages over basing the target value on a delta torque value. This is so because the measured torque value is a more indirect measurement requiring more inferences (e.g., regarding the length of the lever arm, angle between the lever arm and moment of force, etc.) relative to the measured turns value. As a result, prior art applications relying on torque values to characterize a connection between threaded members are significantly inferior to one embodiment of the present intention, which characterizes the connection according to rotation. For example, some prior art teaches applying a specified amount of torque after reaching a shoulder position, but only if the specified amount of torque is less than some predefined maximum, which is necessary for safety reasons. According to one embodiment of the present intention, a delta turns value can be used to calculate a target turns value without regard for a maximum ~~turns~~ torque value. Such an approach is made possible by the greater degree of confidence achieved by relying on rotation rather than torque.